PATENT ABSTRACTS OF JAPAN

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(54) LAYERED LITHIUM SECONDARY BATTERY

(57)Abstract:
PURPOSE: To provide a layered lithium secondary battery by which the battery service life can be lengthened by preventing adverse influence on a battery raw material or battery reaction caused by oxygen.
CONSTITUTION: Current collecting bodies 10 and 12a positive electrode material 11a separator 14 or solid electrolyte containing electrode quality and a negative electrode material 13 are respectively formed in a rectangular shapeand these are alternately layered by one or more setsand a battery element assembly 1 is constituted. The battery element assembly 1 is sealed in an outer case 2and oxygen absorbent 8 is housed and sealed in the case 2. Oxygen entering the case 2 is absorbed by the oxygen absorbent 8.

CLAIMS

[Claim(s)]
[Claim 1]lamination type RICHIUMUNI which laminates by turns a charge collectora positive electrode materiala separator or a solid electrolyte having contained quality of an electrodeand 1 or more sets of negative electrode materials -- a layered product of each of said member being enclosed in an armor bodyand in next cell. A lamination type lithium secondary battery putting in and sealing an oxygen absorbent in an armor body.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to the lamination type lithium secondary

battery produced using a thick film formation methodand relates to the internal corrosion prevention means especially.
[0002]
[Description of the Prior Art]Although the conventional cell had the structure where an anode and a negative electrode generally confronted each other via the separator which constitutes a separate block and contains an electrolyteLike [in order to attain a light weighthigh-energy-density-izationetc.] the lithium cell indicated in JP2-297860AThe separatornegative electrode materialnegative pole collector containing a positive electrode materiala positive pole collectora positive electrode materialand an electrolyteEach sheet of a negative electrode material is rolled spirally in pilesthis cell element assembly rolled spirally is accommodated in the case of a cylindrical shapeand there are some which were closed with the cap attached via the gasket which constitutes as a negative pole terminal and becomes an effective area of a case by resin etc. in a positive pole terminal and the case undersurface about the case upper surface.
[0003]
[Problem(s) to be Solved by the Invention]Howeveraccording to this structurefrom the gasket parts which constitute a sealed partoxygen in the air invades and by this oxygen. The charge collector used as an anode and a negative electrodefor examplealuminumcopperetc.may corroderust may occurthe short circuit of two poles may be caused by rustand an armor body may expand or explodeand there was a problem of an electrolysis solution having deteriorated or checking a cell reaction.
[0004]This invention prevents the adverse effect to the cell raw material and cell reaction by oxygen in view of the problem of the above-mentioned conventional technologyand an object of this invention is to provide the lamination type lithium secondary battery with which prolongation-of-life-ization of a cell is attained.
[0005]
[Means for Solving the Problem]lamination type RICHIUMUNI which laminates by turns a charge collectora positive electrode materiala separator or a solid electrolyte having contained quality of an electrodeand 1 or more sets of negative electrode materials in order that this invention may attain the above-mentioned purpose -- in next cellA layered product of each of said member was enclosed in an armor bodyand an oxygen absorbent was put in and sealed in an armor body. nickel and aluminum are used as said positive pole collectorand Cu is used as a negative pole collector. As an active material used for a positive electrode materialalkali metal oxidessuch as $LiCoO_2$An oxide of other metal of MnO_2or other metaland a multiple oxide with hydroxideChromium oxidation thingssuch as vanadium oxidessuch as $V_2O_5$and Cr_2O_5Transition metal TORIKARUKOGENAITOsuch as transition metal JIKARUKOGENAITOsuch as $TiS_2$$MoS_2$and $FeS_2$and $NbSe_3$a cheveu rel phase ($A_xMo_6Ch_8$A=LiCuCh=SSex= 0-4)etc. are used. A conductive polymer etc. which dope the metal LiLi alloyor Liand can be dedoped as an active material used for a negative electrode material are used. An electrolysis solution impregnated with a separator is used by what dissolved a solute in a nonaqueous solventand as a solventEthylene carbonatepropylene carbonatedimethyl sulfoxideGamma-butyrolactonesulfolanemethyl sulfolanegamma-valerolactonegamma-octano IKKU lactone1.2-diethoxyethane1.2-dimethoxyethaneThey are used by 2-methyltetrahydrofuran1.3-dioxolaneacetonitrilepropionitrilediethylethera TERORA hydronaliumfranc1.2-dibutoxyethaneetc.and as a

soluteLiClO4LiAsF6LiPF6LiBF4LiB(C6H5) 4LiClLiBrCH3SO2 LiCF2SO2 LiLiCF3SO3etc. are used. A solid electrolyte can also be used. As an oxygen absorbenta thing of an inorganic system using oxidation reaction of iron powder or an iron compound and a thing using oxidation reaction of sugar or reductones and adsorption capacity of activated carbon of an organic system are used.

[0006]

[Function]Since the lamination type lithium secondary battery of this invention enclosed the oxygen absorbent in the armor body as mentioned abovethe oxygen which invades in an armor body is absorbed by this oxygen absorbentand the inside of an armor body is maintained at anoxia atmosphere.

[0007]

[Example]The part plan of an armor body main part and (C of drawing of longitudinal section showing one example of the cell according [drawing 1 (A)] to this invention and (B)) are the elements on larger scale of (A). The armor body whichas for onea cell element assembly and 2 become from the armor body main part 3 made of resin and the lid 4and 5 and 6 are the positive pole terminals and negative pole terminals which were fabricated by the armor body main part 3 and one among a figurerespectively. 7 is the concave oxygen absorbent seat part formed in a part of armor body main part 3and accommodates the powdered oxygen absorbent 8 in this seat part 7. This seat part 7 and the inside of the armor body 2 are made to open for free passage by the vent 9 smaller than the particle diameter of the oxygen absorbent 8.

[0008]As shown in the side view of drawing 2 (A)and the perspective view of (B)the layer built cell 1The positive electrode material 11 is superimposed on one side or both sides of the positive pole collector 10 by the sheet method or print processes at oneOn the other handsuperimpose the negative electrode material 13 also on one side or both sides of the negative pole collector 12 at onethe separator 14 (or solid electrolyte) having contained the quality of an electrode is made to intervene between these positive electrode materials 11 and the negative electrode material 13and 1 or more sets is laminated.

The charge collectors 10 and 12 have extended in order to connect with said terminals 5 and 6.

Such materials 10-14 make rectangular plate shaperespectively.

[0009]The positive electrode material 11 which joined together with the binder which becomes by resin etc.and specifically formed positive active material like $LiCoO_2$etc. in the both sides or one side of the metal membrane (paste) or a sheet with the electric conduction powder which becomes by graphite using aluminum as the positive pole collector 10 is formedWhat formed the negative electrode material 13 which combines the graphite as negative electrode active material with the both sides or one side of the metal membrane (paste) or a sheet with a binder was usedusing Cu as the negative pole collector 12. As an electrolytewhat impregnated with this at the micropore of the separators 14 made of resinsuch as polypropyleneusing the liquid electrolyte in which $LiClO_4$ etc. were dissolved into the solvent with which ethylene carbonate (EC) and diethylene carbonate (DEC) were mixed by the weight ratio of 1 to 1 was used.

[0010]As drawing 3 is an example figure of the assembly process of the cell element assembly 1 of this examplethe raw material shown in drawing 2 (B) is laminated like drawing 3 (A) and it is shown in drawing 3 (B)the portion 15a which put the heat

contraction nature sheet 15 on this laminated thingand was wrapped except for the section extending of the charge collectors 10 and 12and the end of the sheet 15 piled up -- adhesion -- or hot welding is carried outthe sheet 15 is heated and shrunk from the circumferenceand said raw materials 10-14 are put on one. As shown in drawing 3 (C)and the ends of the positive pole collector 10 of two or more sheets. or [pasting up the ends of the negative pole collector 12 with electroconductive glue] -- or it welds (16)and it does in this waythe constituted cell element assembly 1 is put in in the armor body main part 3and the end of the charge collectors 10 and 12 is pasted up by electroconductive glue or welded to the terminals 5 and 6 shown in drawing 1 (A)respectively (17)

[0011]Nextit is filled up with the oxygen absorbent 8 in the seat part 7 of the armor body main part 3via adhesivesthe lid 4 is put on the upper surface of the armor body main part 3and it is pastedor the lid 4 is united with the armor body main part 3 by welding of ultrasonic welding etc.and it seals.

[0012]Thussince the oxygen absorbent 8 was enclosed in the sealed armor body 2 and this oxygen is absorbed by the oxygen absorbent 8 even if oxygen invades from the exteriorthe corrosion of the charge collectors 10 and 12 and the deterioration of an electrolysis solution by oxygen are prevented.

[0013]

[Effect of the Invention]According to this inventionsince it is absorbed with an oxygen absorbent even if oxygen invades in an armor bodya charge collector is corroded by oxygenthe occurrence of accidentssuch as expansion or explosioncan be preventedthe adverse effect to a cell reaction can be preventedand a battery life can be prolonged.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]The part plan of an armor body main part and (C of drawing of longitudinal section showing one example of the cell according [(A)] to this invention and (B)) are the elements on larger scale of (A).

[Drawing 2]It is a perspective view in which (A) shows the side view of the cell element assembly of this exampleand (B) shows the state before the assembly.

[Drawing 3](A)(B)and (C) are the perspective views showing each state in the manufacturing process of this example.

[Description of Notations]

1 Cell element assembly
2 Armor body
3 Armor body main part
4 Lid
5 and 6 Terminal
7 Seat part
8 Oxygen absorbent
10 Negative pole collector
11 Negative electrode material
12 Positive pole collector

13 Negative electrode material
14 Separator